RX87Q

Intel® Q87 µATX Motherboard Supports 22nm 4th Generation Core i7/i5/i3, Pentium® CPU

µATX Motherboard

User's Manual

Edition 1.0 – Oct, 2013

FCC Statement

THIS DEVICE SUPPORTS PART 15 FCC RULES. OPERATION IS SUBJECT TO THE FOLLOWING TWO CONDITIONS:

(1) THIS DEVICE MAY NOT CAUSE HARMFUL INTERFERENCE.

(2) THIS DEVICE MUST ACCEPT ANY INTERFERENCE RECEIVED INCLUDING INTERFERENCE THAT MAY CAUSE UNDESIRED OPERATION.

THIS EQUIPMENT HAS BEEN TESTED AND FOUND TO COMPLY WITH THE LIMITS FOR A CLASS "A" DIGITAL DEVICE, PURSUANT TO PART 15 OF THE FCC RULES.

THESE LIMITS ARE DESIGNED TO PROVIDE REASONABLE PROTECTION AGAINST HARMFUL INTERFERENCE WHEN THE EQUIPMENT IS OPERATED IN A COMMERCIAL ENVIRONMENT. THIS EQUIPMENT GENERATES, USES, AND CAN RADIATE RADIO FREQUENCY ENERGY AND, IF NOT INSTATLLED AND USED IN ACCORDANCE WITH THE INSTRUCTION MANUAL, MAY CAUSE HARMFUL INTERFERENCE TO RADIO COMMUNICATIONS.

OPERATION OF THIS EQUIPMENT IN A RESIDENTIAL AREA IS LIKELY TO CAUSE HARMFUL INTERFERENCE IN WHICH CASE THE USER WILL BE REQUIRED TO CORRECT THE INTERFERENCE AT HIS OWN EXPENSE.

Notice

This guide is designed for experienced users to setup the system within the shortest time. For detailed information, please always refer to the electronic user's manual.

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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Your satisfaction is our primary concern. Here is a guide to BCM customer services. To ensure you get the full benefit of our services, please follow the instructions below carefully.

Technical Support

We want you to get the maximum performance from your products. So if you run into technical difficulties, we are here to help. For the most frequently asked questions, you can easily find answers in your product documentation. These answers are normally a lot more detailed than the ones we can give over the phone. So please consult the user's manual first.

To receive the latest version of the user's manual; please visit our Web site at:
http://www.bcmcom.com.

If you still cannot find the answer, gather all the information or questions that apply to your problem, and with the product close at hand, call your dealer. Our dealers are well trained and ready to give you the support you need to get the most from your BCM products. In fact, most problems reported are minor and are able to be easily solved over the phone.
In addition, free technical support is available from BCM engineers every business day. We are always ready to give advice on application requirements or specific information on the installation and operation of any of our products. Please do not hesitate to call or e-mail us.

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Product Warranty

BCM warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship during warranty period.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by BCM, or which have been subject to misuse, abuse, accident or improper installation. BCM assumes no liability under the terms of this warranty as a consequence of such events. Because of BCM high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If any of BCM products is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details. If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU type and speed, BCM products model name, hardware & BIOS revision number, other hardware and software used, etc.) Note anything abnormal and list any on-screen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information available.
3. If your product is diagnosed as defective, obtain an RMA (return material authorization) number from your dealer. This allows us to process your good return more quickly.
4. Carefully pack the defective product, a complete Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.

Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

Manual Objectives

This manual describes in detail the BCM RX87Q Main board.

We strongly recommend that you study this manual carefully before attempting to interface with RX87Q or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings, (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors concerning this manual and want to inform us of these, please contact our Customer Service department with the relevant details.

Safety Precautions

Warning!

Always completely disconnect the power cord from your chassis whenever you work with the hardware. Do not make connections while the power is on. Sensitive electronic components can be damaged by sudden power surges. Only experienced electronics personnel should open the PC chassis.

Caution!

Always ground yourself to remove any static charge before touching the mainboard. Modern electronic devices are very sensitive to static electric charges. As a safety precaution, use a grounding wrist strap at all times. Place all electronic components in a static-dissipative surface or static-shielded bag when they are not in the chassis.

Document Amendment History

Revision	Date	Comment
1st (0.01)	April, 2013	Initial

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Mainboard Specifications

Model	RX87Q
Processor	**Socket LGA1150 supports 4th Generation Core i7/i5/i3 CPU** (up to 84W)
Chipset	Intel® Q87
Memory	4 x 240 Pin DIMM sockets supports DDR3 memory module (1.5V) 1333 (PC3-16000)/ 1600 (PC3—12800) MHz non-ECC up to 32GB (8GB maximum/slot) Standard 1Gb, 2Gb and 4Bb Technologies and addressing are supported for x8 derives
Display	Intel® GMA HD (Must use Intel Processor that provides "Intel HD Graphics" feature)
SATA	6 x SATA III connectors supports Data Transfer rates 6.0Gb/s, 3.0Gb/s and 1.5Gb/s on all ports
PCI-E	1x PCI-E x 16 slots (Slot "PCIEX16")
	1 x PCI-E x4 slot (Slot "PCIEX4_1")
	1 x PCI-E x1 Slots (Slot "PCIEX1_1", "PCIEX1_2")
PCI	3 x PCI Slots (PCI 2.3 compliant)
USB	10 x USB 2.0 ports (5 x header)
	4 x USB3.0 ports (4x rear I/O)
TPM	Infineon® TPM Chip 9635
	1 x TPM 1.2 Security Device
Super I/O Controller	Fintek® F81866AD-I
Serial Ports	6 x RS232 ports (internal header)
LPT	1 x LPT header
Watch Dog Timer	1 ~ 255 sec timer
HW Monitor	Yes
Audio	Realtek® ALC887
	HD Audio Codec with auto jack sensing
LAN	Intel® 217LM Gigabit PHY
	1 x 10/100/1000 LAN
	Intel® 210AT PCI-E Gigabit LAN
	1 x 10/100/1000 LAN
BIOS	Phoenix® BIOS
	Phoenix BIOS with 32Mb SPI ROM

Expansion Slots	
PCI-E	1 x PCI-E x 16 slot 1 x PCI-E x 4 slot 1 x PCI-E x 1 slot
PCI	1 x PCI slot
Onboard I/O Headers	
SATA	6 x Std. SATA Connectors
USB	5 x USB Headers (10 ports on headers)
RS232	6 x Headers
LPT	1 x Header
Front Audio	1 x Header
Amplifier	1 x Header
Front Panel	1 x Header
Fan Header	3 x Headers (4-pins)
Chassis Intrusion Header	1 x Header
LANLED	1 x Header
Digital IO	1 x Header
LVDS	1 x Header (Optional Custom SKU)
Onboard Jumpers	
COM Port Ring-In/ Power Select	4 x Headers provide selections of “Ring-In”, or “12V” or “5V” on COM ports
COM1 RS232/RS422/RS485 Select	3 x Headers provide selections of “RS232”, or “RS422”, or “RS485” on COM1
AT/ATX Select	1 x Header
Clear CMOS	1 x Header
Back I/O Panel	
PS/2 Keyboard /Mouse	1 x DIN 6 Stack up Connector
VGA	1 x DB 15 Connector
DVI	1 x DVI Connector
Displayport	2 x Displayport Connectors
USB3.0	4x Stack up USB Connector
LAN and USB	2 x Stack up RJ45 with USB Connectors
Audio	1 x 3 Jacks Audio Connector (Line-in, Line-Out, Mic)
Power & Connector	
	1 x Std. 24 pin ATX Connector
	1 x 4 pin ATX 12 Connector
Form Factor	

	ATX 9.6” x 9.6”

1. Chapter 1: System Setup

This chapter describes the mainboard features and the new technologies it supports

1.1 Welcome!

The mainboard delivers a host of new features and latest technologies, making it another line of BCM long life mainboards! Before you start installing the mainboard, and hardware devices on it, check the items in your package with the list below.

If any of the items listed below is damaged of missing, please contact with your vendor.

1.2 Packing Contents

- **Mainboard**
  - **1 x RX87Q**

- **Cable**
  - **2 x Serial ATA Cable**
  - **2 x COM port Cable**

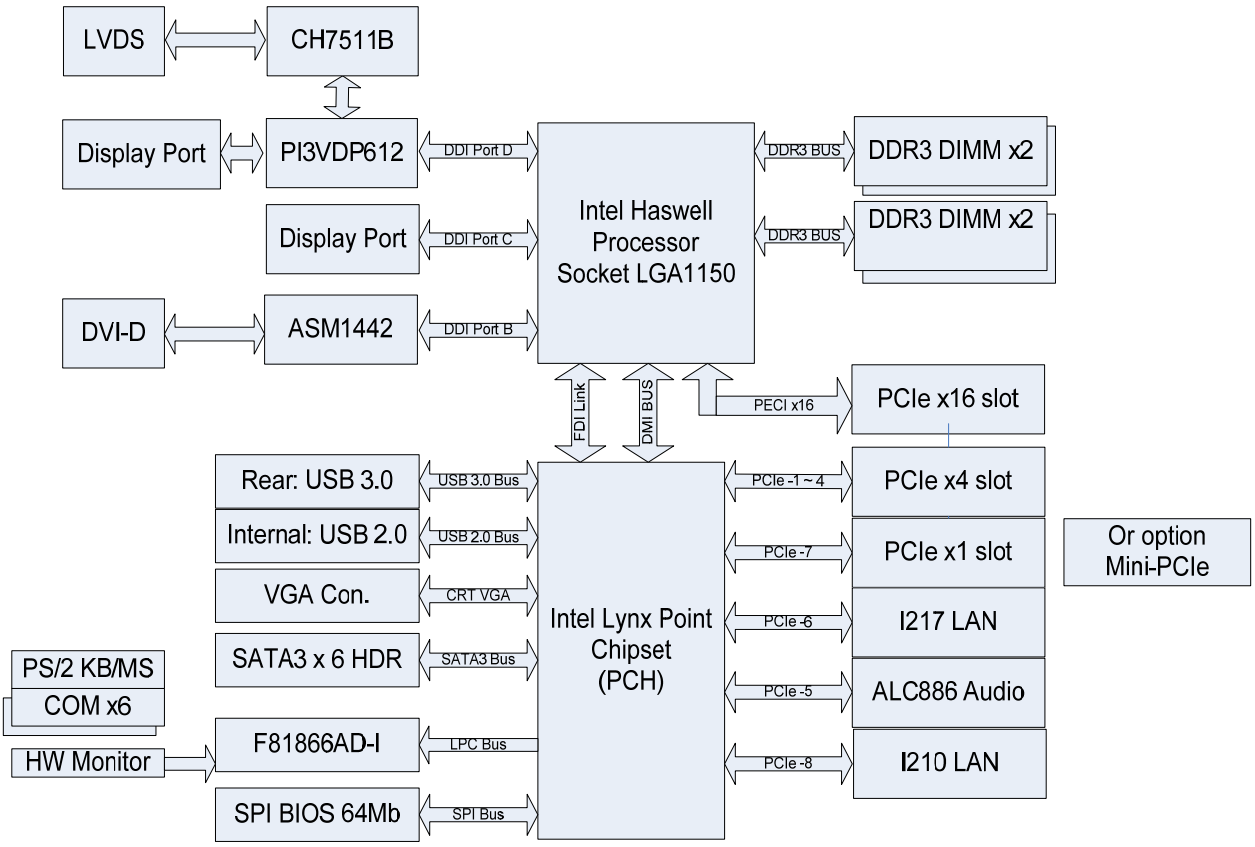
- **Accessories**
  - **1 x RX87Q I/O Shield**

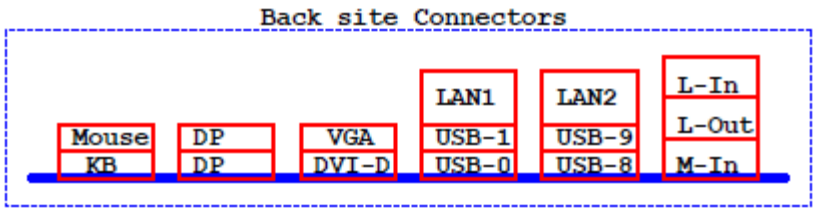
- **Drivers**
  - **Drivers is available for download at BCM website at WWW.BCMCOM.COM**

- **Documentation**
  - **Quick Installation Guide and Manual are available for download at BCM website at WWW.BCMCOM.COM**

1.3 Features

RX87Q block Diagram





1.3.1 Product Highlights

• Intel® i7/i5/i3 LGA1150 Processor Support

This mainboard supports Intel® 4th generation Haswell i7/i5/i3 processors in the LGA1150 package.

• Intel® Q87 Express Chipset

The Intel® Q87 PCH provides all business with more effective costs management, safer computing environment, and deploys more responsive PCs.

• DDR3 Memory Support

The mainboard supports DDR3 memory that features data transfer rates of 1333/ 1600MHz to meet the higher bandwidth requirements of the latest 3D graphics, multimedia, and Internet applications.

• High Definition Audio

The mainboard came with the Realtek ALC887 HD audio CODEC that lets you enjoy high quality 7.1+2 channel audio without having to buy advanced sound cards.

• PCI-E x16 support

The PCI-E x16 VGA interface specification enhances graphics performance with high bandwidth (PCIEX16 slot only).

• PCI-E x4 support

The PCI-E x4 reside with PCI-E x 16 slot allow option to install a second graphics adaptor

• USB 3.0 Technology

The mainboard implements the Universal Serial Bus (USB) 3.0 specification, which provides transfer rate up to 4.8Gbps. USB3.0 is backward compatible with USB2.0.

• Trusted Platform Module (TPM) Support

By combining the onboard TPM 1.2 with TPM security software (provided by the third party), it will enhance the security level of the system.

• PRECAUTION: When TPM is enabled and utilized through TPM software, there is possibility that the encrypted data will not be accessible, or recoverable if one of the following situations occurred:

1. Lost of TPM password.

2. System or board failure, or being replaced.

3. Hard Drive failure.

1.4 Before you proceed

Take note of the following precautions before you install mainboard components or change any mainboard settings.

- **Unplug the power cord from the wall socket before touching any component inside the system.**
- **Use a grounded wrist strap or touch a safely grounded object or to a metal object, such as the power supply case, before handling components to avoid damaging them due to static electricity.**
- **Hold components by the edges to avoid touching the ICs on them.**
- **Whenever you uninstall any component, place it on a grounded antistatic pad or in the bag that came with the component.**
- **Before you install or remove any component, ensure that the ATX power supply is switched off or the power cord is detached from the power supply. Failure to do so may cause severe damage to the mainboard, peripherals, and/or components.**

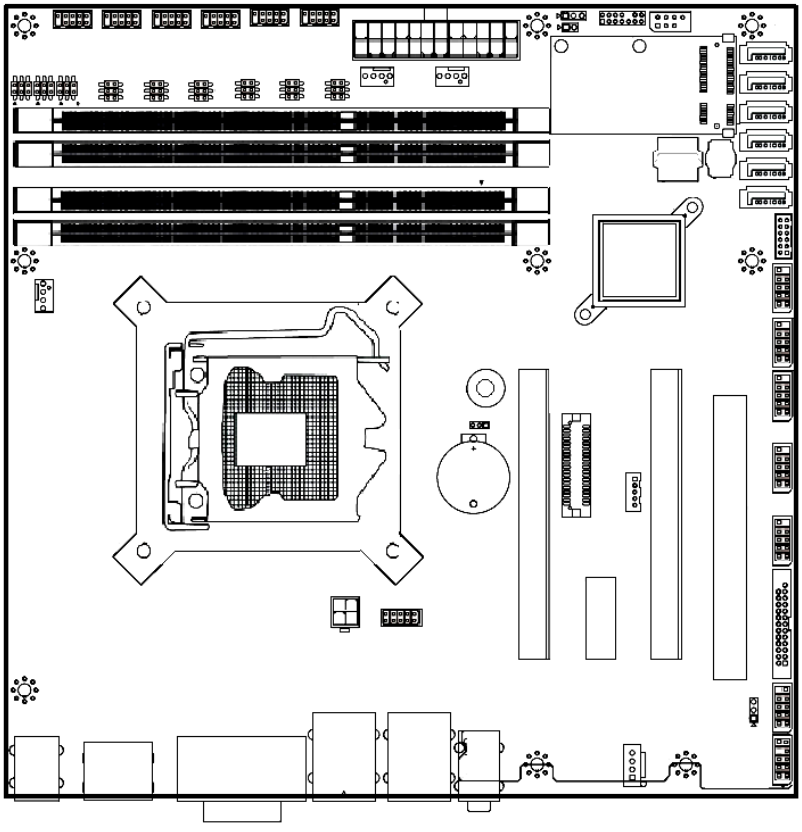
1.5 Mainboard Overview

Before you install the mainboard, study the configuration of your chassis to ensure that the mainboard fits into it.

Make sure to unplug the power cord before installing or removing the mainboard. Failure to do so can cause you physical injury and damage mainboard components.

1.5.1 Placement Direction

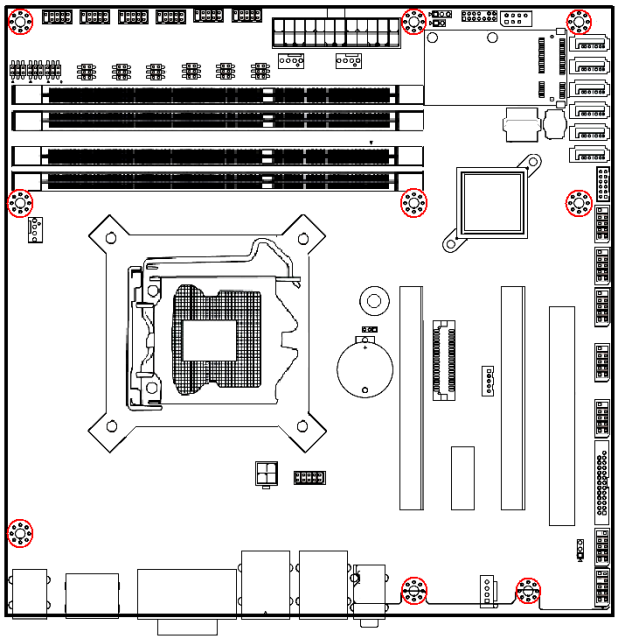
When installing the mainboard, make sure that you place it into the chassis in the correct orientation. The edge with external port goes to the rear part of the chassis as indicated in the image below.



1.5.2 Mounting Holes

Place the screws into the mounting holes indicated by red squares to secure the mainboard to the chassis.

Do not over-tighten the screws! Doing so may damage the mainboard.



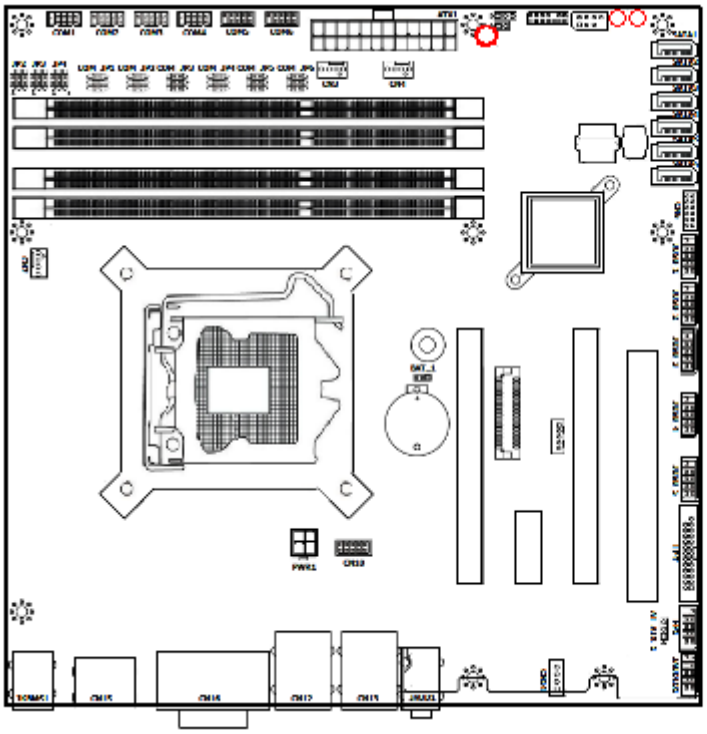
1.5.3 Onboard LEDs

The mainboard comes with a “Power On LED” (green) to indicate the system power status. When power cable is connect to the power source. The “Power LED” lights will be on to indicate that the system has standby power. This is a reminder that you should shut down the system and unplug the power cable before adding/ removing or plugging in any mainboard component. The illustration below shows the locations of onboard LEDs.

LED1 =VCC+5V (reserved)

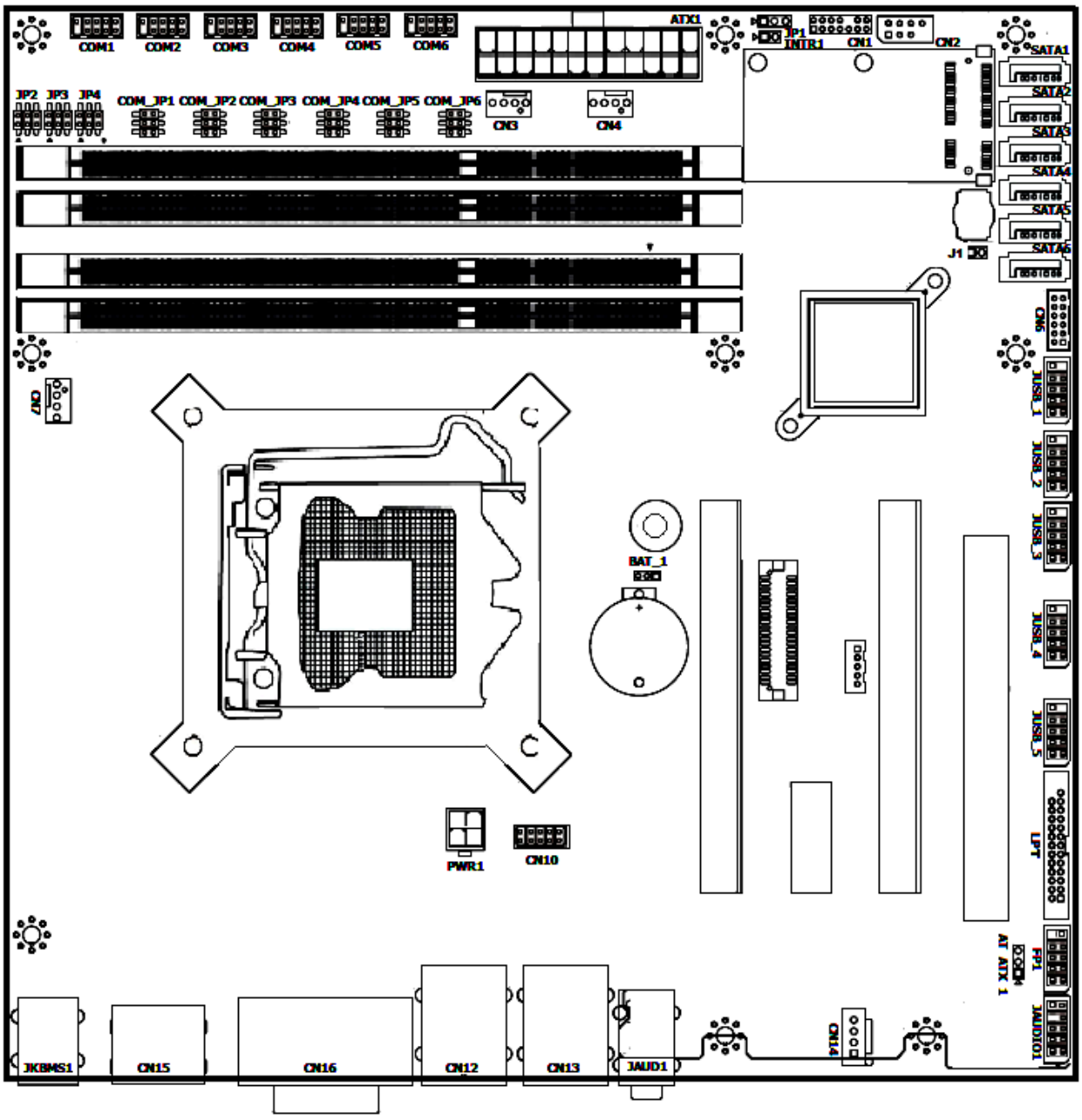
LED2 =VSB+5V (reserved)

LED3 = +5V (Power)

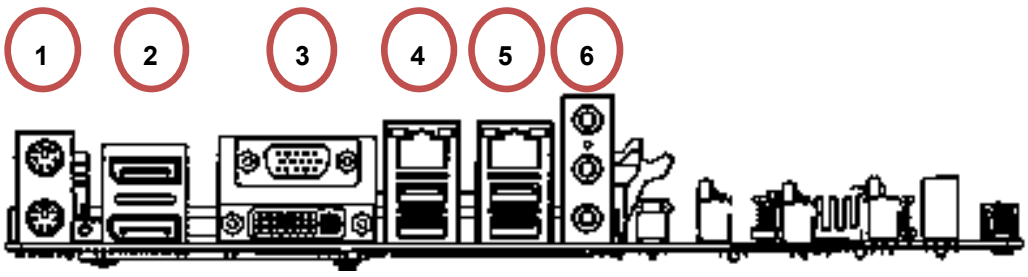


LED3: Power On LED (Green)

1.5.4 Mainboard Layout



• **Back Panel:**



1.5.5 Layout Content List

• 1.5.5.1 Slots

Label	Function	Note	Page
DIMM1	240-pin DIMM slot 1	1. If there is only one memory module being installed in the system, install it on this slot first. 2. If there are only two memory modules being installed in the system, install these 2 modules on “DIMM1” and “DIMM3” first.	31
DIMM2	240-pin DIMM slot 2	If you have only one memory module being installed in the system, install the module on “DIMM2”	31
DIMM3	240-pin DIMM slot 3	If there are only two memory modules being installed in the system, install these 2 modules on “DIMM1” and “DIMM3” first.	31
DIMM4	240-pin DIMM slot 4		31
Slot1	PCI express x16 slot		51
Slot3	PCI express x4 slot		51
Slot2	PCI express x1 slot		51
Slot4	PCI slot		51

• 1.5.5.2 Internal Jumpers

Label	Function	Note	Page
JP5	Clear CMOS	3 x 1 header, pitch 2.54mm	48
JP2, JP3, JP4	COM1 RS232/RS422/RS485 Select	3 x 2 header, pitch 2.00mm	48
COM_JP1 COM_JP2 COM_JP3 COM_JP4 COM_JP5 COM_JP6	COM1, COM2, COM3, COM4 RI/+5V/+12V Select	3 x 2 header, pitch 2.00mm	49
AT_ATX1	AT/ATX Power Select	3 x 1 header, pitch 2.54mm	49

• 1.5.5.3 Internal Headers			
Label	**Function**	**Note**	**Page**
PWR1	ATX Power Connector	2 x 2 header	47
ATX1	ATX Power Connector	12 x 2 header	47
SATA1 SATA2 SATA3 SATA4 SATA5 SATA6	Serial ATA Connectors 1~6	7-pin header	38
CPU_FAN (CN7)	CPU Fan Connector	4 x 1 wafer, pitch 2.54mm	28
CHA_FAN1 (CN3)	Chassis Fan Connector	4 x 1 wafer, pitch 2.54mm	39
SYS_FAN1 (CN4)	System Fan Connector	4 x 1 wafer, pitch 2.54mm	39
INTR1	Chassis Intrusion Connector	2 x 1 header, pitch 2.54mm	42
J_AUDIO1	Front Panel Audio Connector	5 x 2 header, pitch 2.54mm	43
CN14	Amplifier Connector	4 x 1 header, pitch 2.54mm	44
JUSB_1 JUSB_2 JUSB_3 JUSB_4 JUSB_5	USB 2.0 Connector	5 x 2 header, pitch 2.54mm	44
COM1 COM2 COM3 COM4 COM5 COM6	Serial Port Connector 1, 2, 3, 4,5,6	5 x 2 header, pitch 2.00mm	45
LPT	Parallel Port Connector	13 x 2 header, pitch 2.00mm	45
FP1	System Panel Connector	5 x 2 header, pitch 2.54mm	43
CN6	Digital I/O header	10 x 2 header, pitch 2.54mm	44
CN2	SPI pin header (Factory use only)	4 x 2 header, pitch 2.54mm	44
CN1	Reserved	2 x 7 header, pitch 2.0mm	

• 1.5.5.4 Back Panel Connectors			
Label	**Function**	**Note**	**Page**
KBMS	PS/2 keyboard and mouse	6-pin Mini-Din	37
VGA/ DVI	VGA Connector x 1 DVI Connector x 1	D-sub 15-pins, female Dual Link DVI-D; 24-pins	36
DP1/ DP2	Display Port x 2 (COM1/ COM2)		3
LAN1/ LAN2	RJ-45 Ethernet Connector x 2		37
USB	USB3.0 Connector x 4		38
AUDIO	Line-in Port, Line-out Port, Microphone Port,	5.1 Channel Audio I/O (3 jacks)	36, 37

1.6 Central Processing Unit (CPU)

This mainboard supports the Intel® LGA1150 socket for 4th generation Intel® Core™ i7/i5/i3 22nm desktop processors. If you do not have the CPU cooler, consult with your dealer before turning on the system.

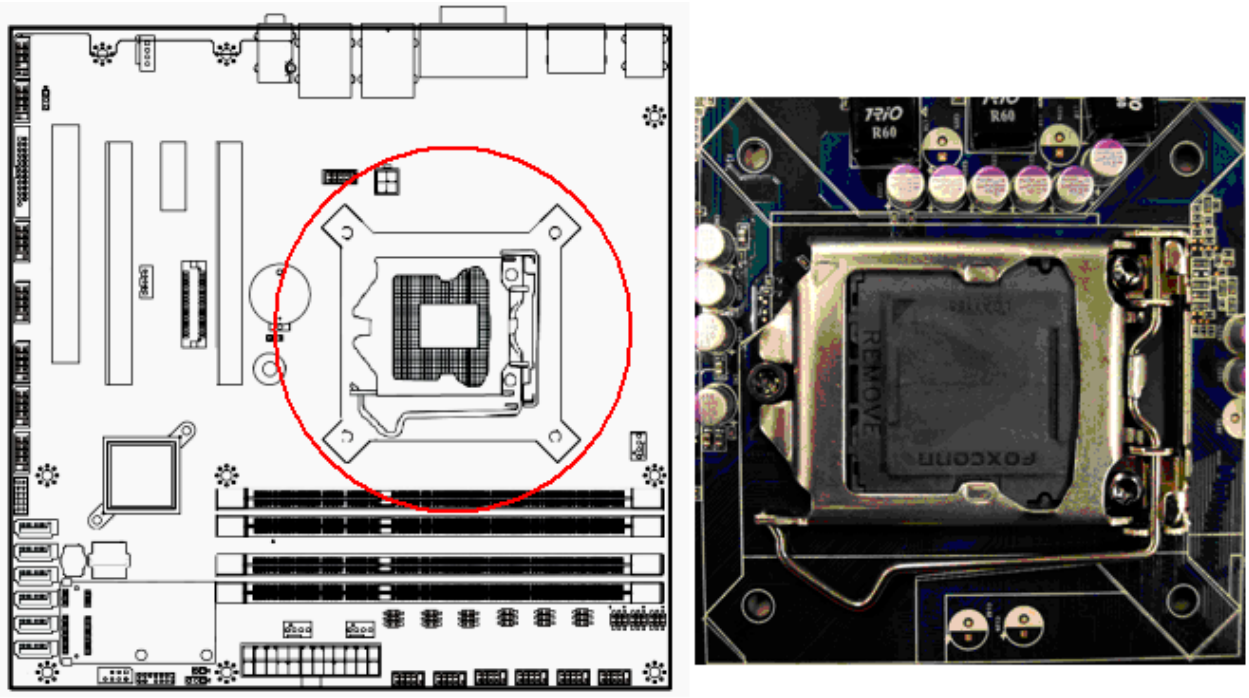
- Your boxed Intel® LGA1150 processor package should come with installation instructions for the CPU, fan, heatsink, and the retention assembly.
- Upon purchase of the mainboard, make sure that the PnP cap is on the socket and the socket pins are not bent. Contact your retailer immediately if the PnP cap is missing, or if you see any damage to the PnP cap/socket pins/mainboard components. BCM will shoulder the cost of repair only, if the damage is shipment/ transit-related.
- Keep the PnP cap after installing the mainboard. BCM will process Return Merchandise Authorization (RMA) requests only if the mainboard comes with the cap installed on the LGA1150 socket.
- The product warranty does not cover damage to the socket pins resulting from incorrect CPU installation/ removal, or misplacement/ loss/ incorrect removal of the PnP cap.

1. **Overheating: Overheating will seriously damage the CPU and mainboard. Always make sure the cooling fan can work properly to protect the CPU from overheating.**
2. **Make sure that you apply an even layer of thermal paste between the CPU and the heatsink to enhance heat dissipation.**
3. **Replacing the CPU: While replacing the CPU, always turn off the ATX power suppply or unplug the power supply's powr cord from the grounded outlet first in order to prevent damage to the system.**

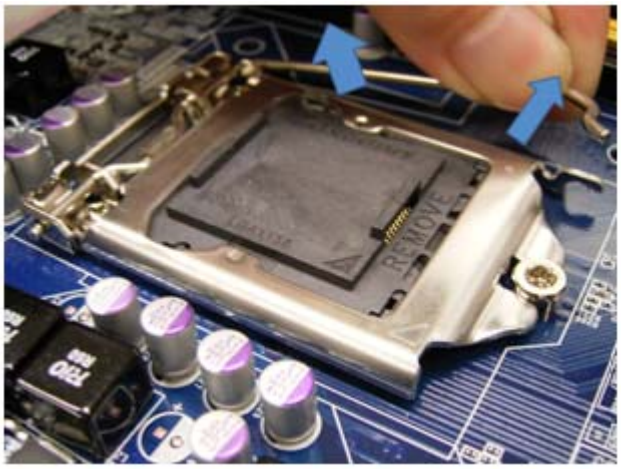
1.6.1 Installing the CPU

To install a CPU

1. Locate the CPU socket (LGA1150 Socket) on the mainboard.

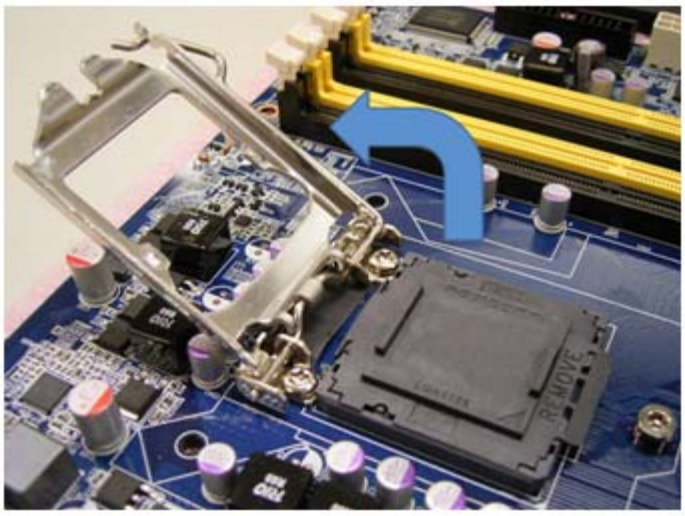


2. Unlatch the “CPU Socket Lever” by pressing the lever down and move it away from the main structure of the socket.



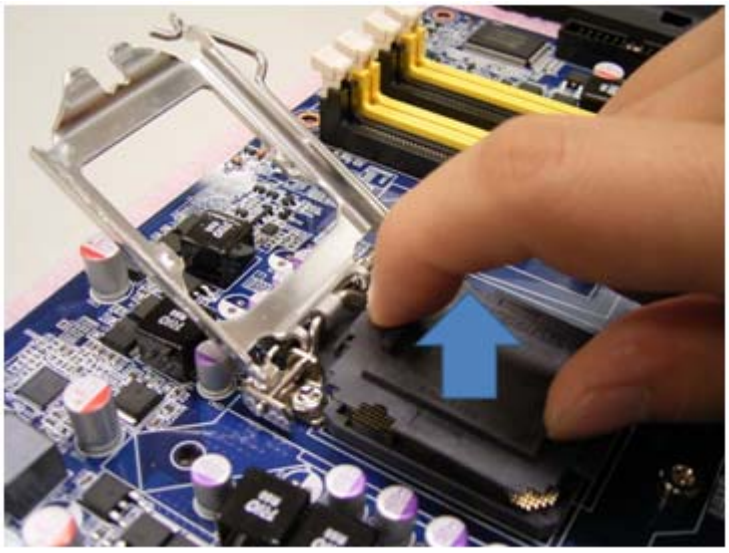
To prevent damage to the socket pins, do not remove the “CPU Socket Cover” (PnP cap) unless you are going to install a CPU.

3. Lift the load lever up in the direction of the arrow to a 135° angle, so the metal “CPU Socket Cover” can also be lifted.

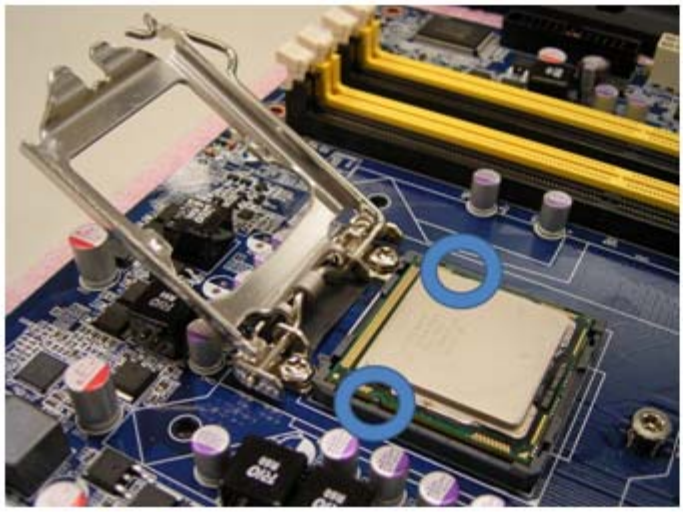


4. The CPU socket has a plastic protection cap installed on it (black color, a.k.a. “CPU Socket Cover”, or “PnP cap”) in order to protect the socket pins from damage. If you are going to install a CPU, remove the plastic protection cap away from the CPU socket by lifting it up

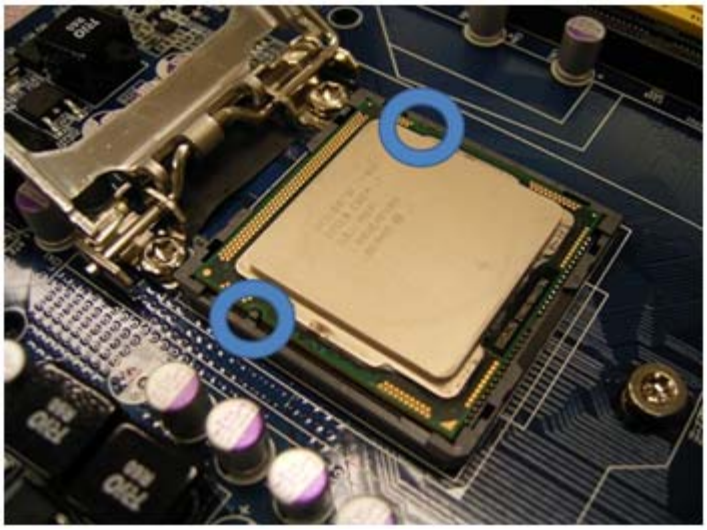
   (NOTE: Please do not discard this plastic protection cap. Just in case if you need to RMA this board in the future, you need to install this plastic protection cap in order to protect the CPU socket)



5. There are two notches on the CPU itself (one on each side), and there are two “Socket Alignment keys” on the CPU socket as well. Line up the two CPU notches with the “Socket Alignment Keys” on the socket, and insert the CPU into the CPU socket slowly.

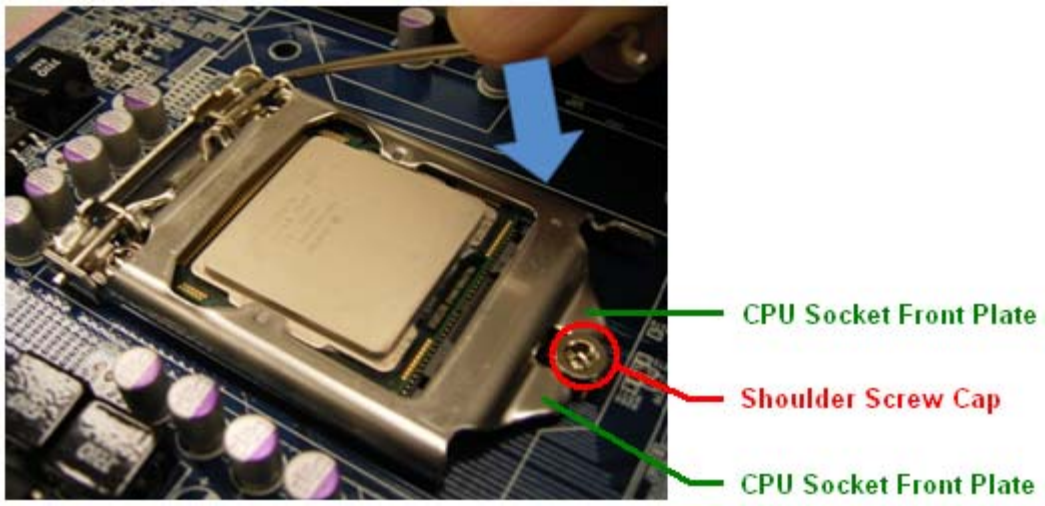


Visually inspect if the CPU is seated into the CPU socket evenly. The “Socket Alignment keys” should fit into the CPU notches.

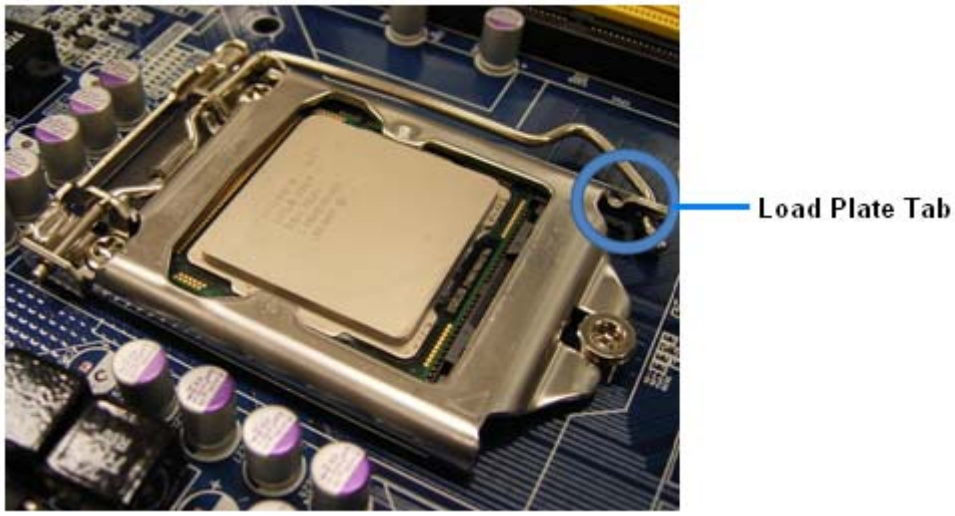


To prevent CPU damage, please take precaution necessary for ESD.

6. Close the “CPU Socket Cover” by lowering down the “CPU Socket Lever”. Make sure the “CPU Socket Front Plates” are sliding underneath the “Shoulder Screw Cap”.



8. Secure the “CPU Socket Cover” by keep pressing down the “CPU Socket Lever” and move it toward and underneath the “Load Plate Tab”.



The CPU fits in only one correct orientation, DO NOT force the CPU into the socket. Otherwise, it might damage the CPU and/or the CPU socket.

1.6.2 Installing the CPU Heatsink and Fan

The Intel LGA1150 processor requires a specially designed heatsink and fan assembly to ensure optimum thermal condition and performance.

- When you purchase a boxed Intel® processor, the package includes the CPU fan and heatsink assembly. If you buy a CPU separately, make sure that you only use Intel®-certified multi-directional heatsink and fan.
- Your Intel® LGA1155 heatsink and fan assembly comes in a push-pin design and requires no tool to install.
- If you purchased a separate CPU heatsink and fan assembly, make sure that:

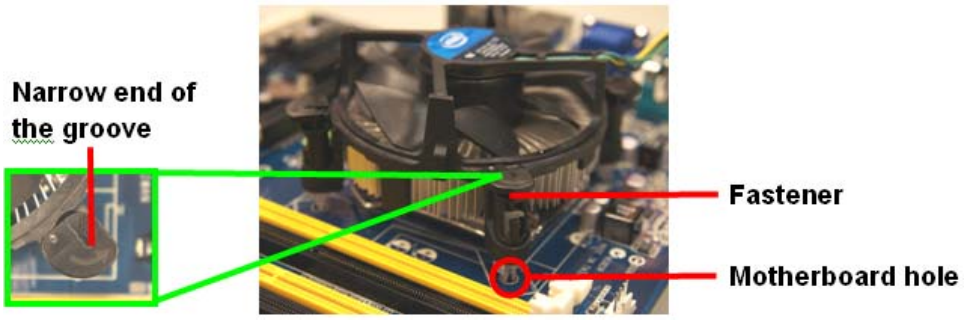
  a. The CPU heatsink and fan assembly is designed to withstand the "TDP" (Thermal Dissipation Power) specified by Intel specification of corresponding CPU that you are going to install.

  b. You have properly applied an even layer of "Thermal Interface Material" to between the CPU heatsink and the top of CPU before you install the heatsink and fan assembly (please check with your CPU fan/heatsink vendor for details).

NOTE: Make sure that you have installed the mainboard to the chassis before you install the CPU fan and heatsink assembly.

To install the CPU heatsink and fan:

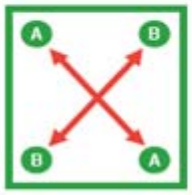
1. Place the CPU heatsink on top of the installed CPU, make sure that the four fasteners are line-up with the four "motherboard hole" around the CPU socket.

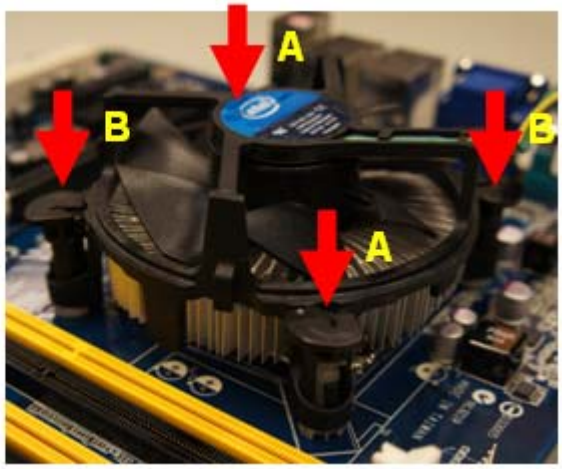


NOTE: Orient the heatsink and fan assembly so the CPU fan cable is close to the CPU fan connector).

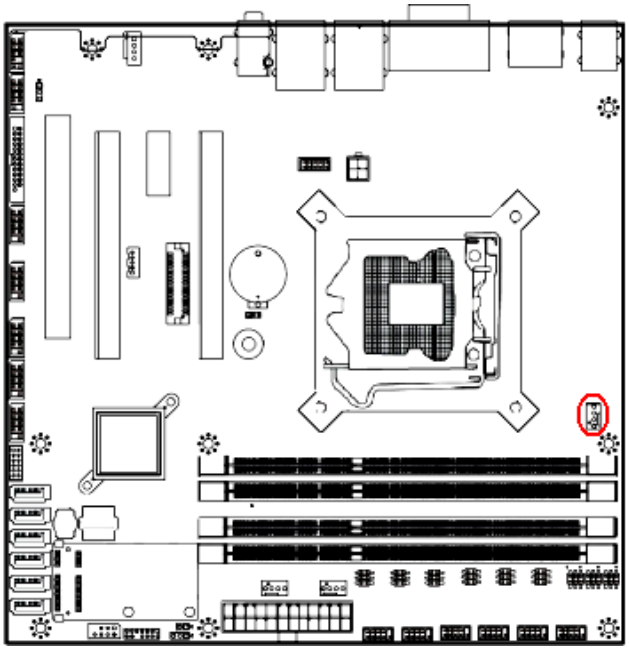
Make sure to orient each fastener with the narrow end of the groove pointing outward. (The photo shows the groove shaded for emphasis.)

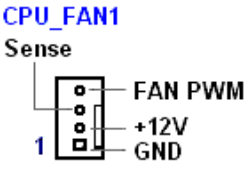
2. Push down two fasteners at a time in a diagonal sequence to secure the heatsink and fan assembly in place.

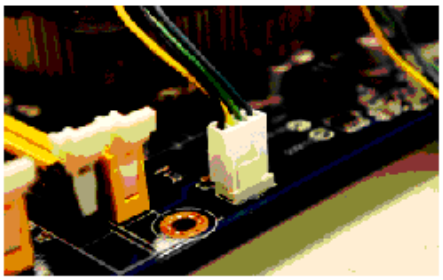




3. Connect the CPU fan cable to the connector on the motherboard labeled “CPU_FAN1”.







1. Do not forget to connect the CPU fan connector. Insufficient air flow inside the *system* chassis may damage the mainboard components. Hardware monitoring errors can occur if you fail to plug in this connector.

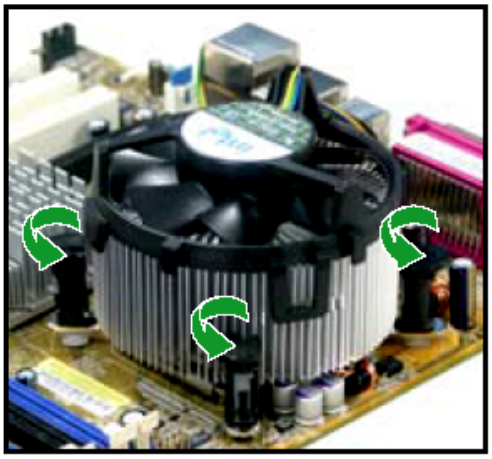
2. Do not install any pin connector on the header “CPU_FAN1”, doing so may damage the mainboard.

1.6.3 Uninstalling the CPU Heatsink and Fan.

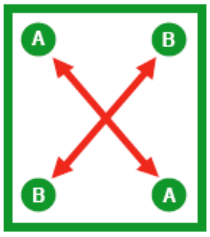
To uninstall the CPU heatsink and fan:

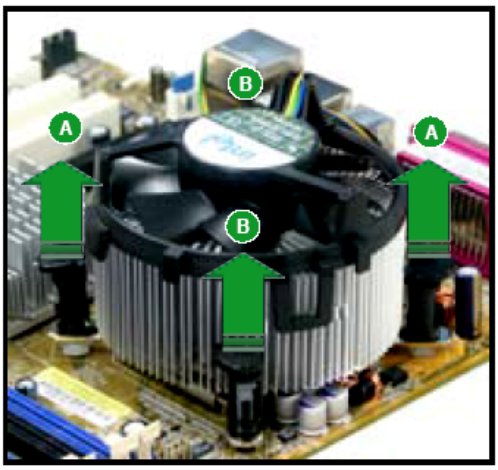
1. Disconnect the CPU fan cable from the connector on the mainboard.

2. Rotate each fastener counterclockwise.

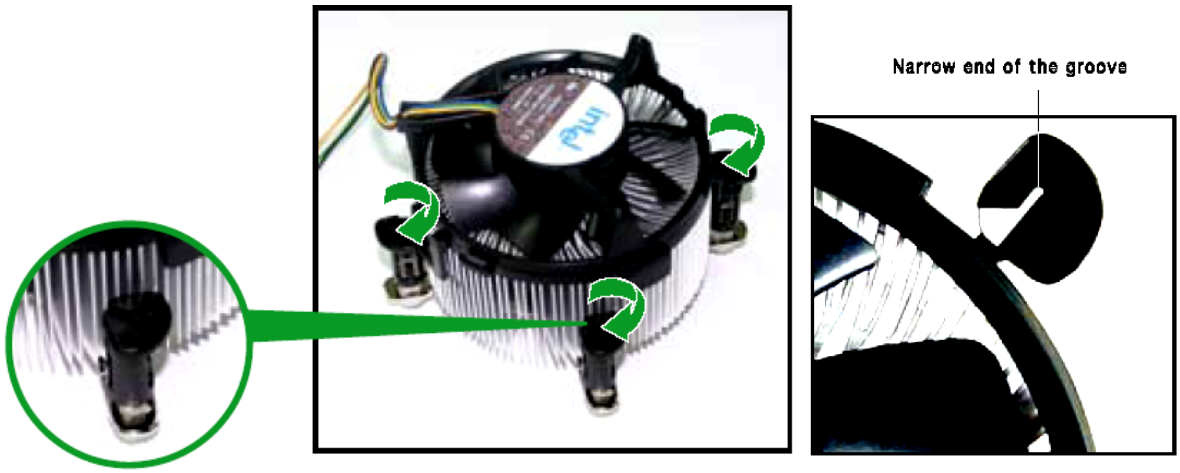


4. Pull up two fasteners at a time in a diagonal sequence to disengage the heatsink and fan assembly from the mainboard.





5. Rotate each fastener clockwise to ensure correct orientation when reinstalling.



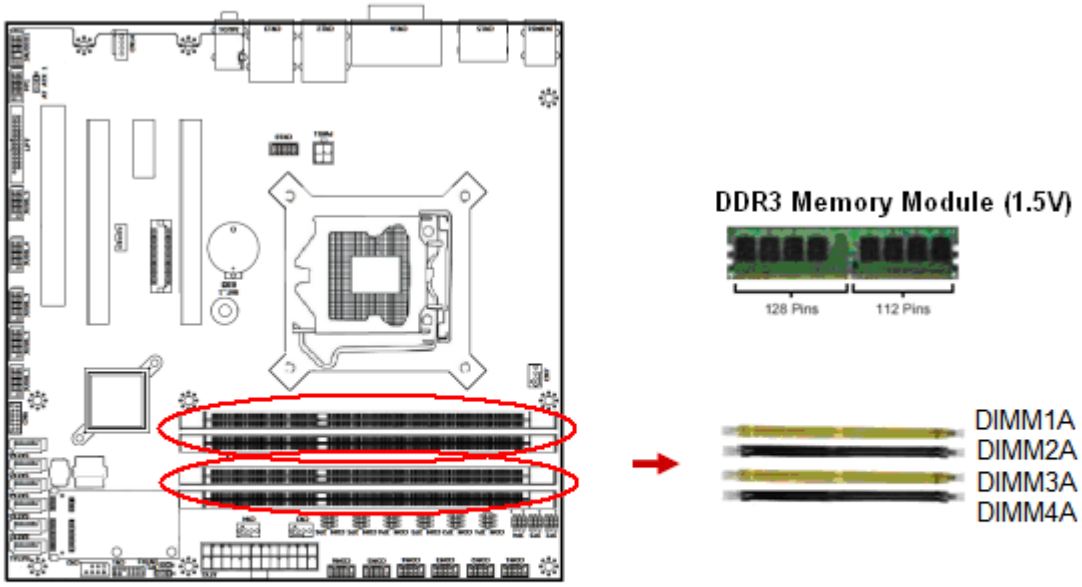
The narrow end of the groove should point outward after resetting. (The photo shows the groove shaded for emphasis.)

1.7 System Memory

1.7.1 Overview

The mainboard comes with four 240-pin Double Data Rate 3 (DDR3) Dual Inline Memory Modules (DIMM) slots. **You may use 1600MHz (PC3-12800, 1333MHz (PC3-10600); Non-ECC, Un-buffered 1.5V DDR3 memory modules on this board (8GB maximum for each slot).**

DDR3 DIMMs are notched differently to prevent installation on a DDR2 DIMM socket. The following figure illustrates the location of memory slots.



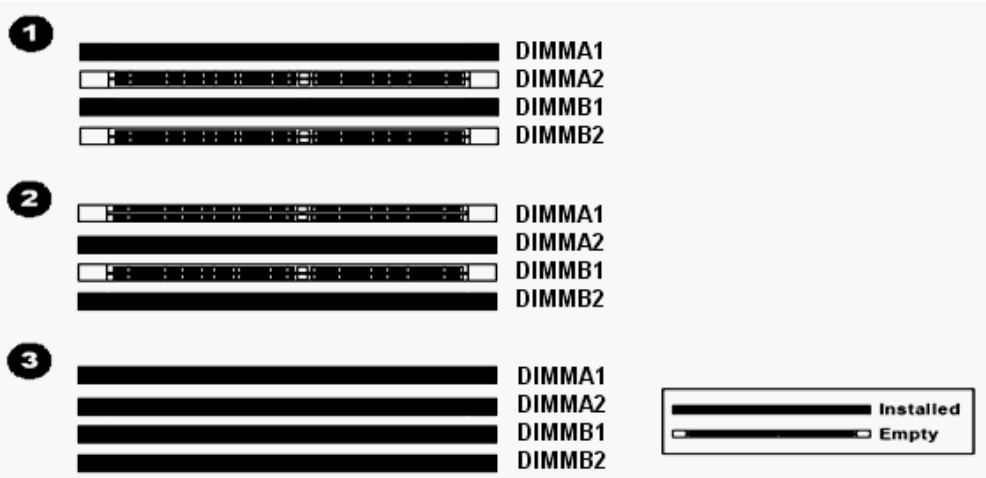
Channel	Socket
Channel A	DIMM1A & DIMM2A
Channel B	DIMM3A & DIMM4A

1.7.2 Configurations of Supported Memory Modules (Non-ECC, Unbuffered)

Raw Card Version	DIMM Capacity	DRAM Device Technology	DRAM Organization	# of DRAM Devices	# of Physical Devices Ranks	# of Row / Col Address Bits	# of Banks Inside DRAM	Page Size
Desktop/Server/Workstation Platforms:								
Unbuffered/Non-ECC Supported DIMM Module Configurations								
A	1 GB	1 Gb	128 M X 8	8	1	14/10	8	8K
B	2 GB	1 Gb	128 M X 8	16	2	14/10	8	8K
	4 GB	2 Gb	256 M X 8	16	2	15/10	8	8K
	4 GB	4 Gb	512 M X 8	8	1	15/10	8	8K
	8 GB	4 Gb	512 M X 8	16	2	16/10	8	8K
Server and Workstation Platforms:								
Unbuffered/ECC Supported DIMM Module Configurations								
D	1 GB	1 Gb	128 M X 8	9	1	14/10	8	8K
	2 GB	2 Gb	256 M X 8	9	1	15/10	8	8K
E	2 GB	1 Gb	128 M X 8	18	2	14/10	8	8K
	4 GB	2 Gb	256 M X 8	18	2	15/10	8	8K
	8 GB	4 Gb	512 M X 8	18	2	16/10	8	8K

1.7.3 Dual-Channel Mode Population Rule

In Dual-Channel mode, the memory modules can transmit and receive data with two data bus lines simultaneously. Enabling Dual-Channel mode can enhance the system performance. Please refer to the following illustrations for population rules under Dual-Channel mode.



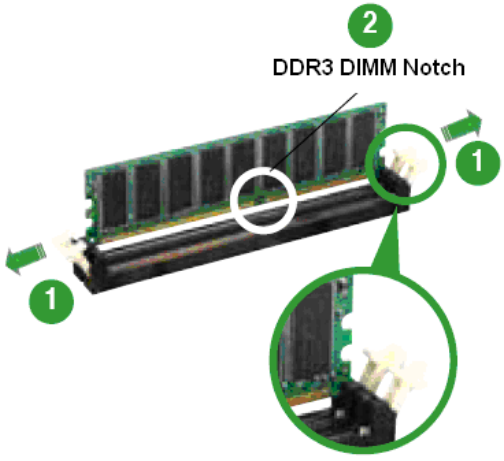
- **Install at least 1GB of memory module onboard.**

- **When install only one DDR3 memory module, install it on "DIMMA1" slot ONLY.**
- **When install only two DDR3 memory module, install them on "DIMMA1" and "DIMMB1" slots ONLY.**
- **In dual-channel configurations, install only identical (the same type, and size) DDR3 memory module paired for each channel. For instance, DIMMA1 paired with DIMMB1; DIMMA2 paired with DIMMB2.**
- **Always install DIMMs with the same CAS latency. For optimum compatibility, it is recommended that you obtain the exact same model of memory modules from the same vendor.**

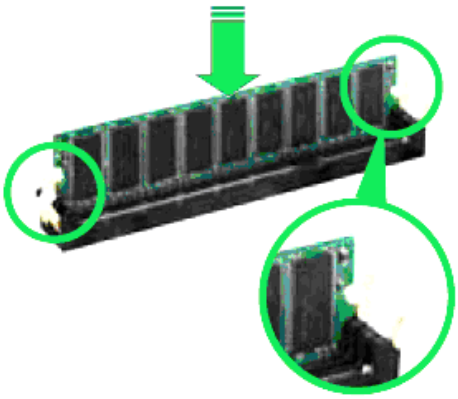
1.7.4 Installing DIMM

Make sure to unplug the power supply before adding or removing DIMMS or other peripherals from the system. Failure to do so may cause severe damage to both the mainboard and the peripherals.

1. Unlock a DIMM socket by pressing the retaining clips outward.
2. Align a DIMM on the socket such that the notch on the DIMM matches the break on the socket.



3. Firmly insert the DIMM into the socket until the retaining clips snap back in place and the DIMM is properly seated.



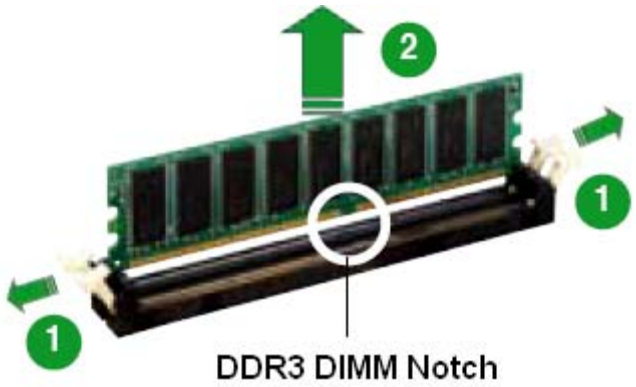
Locked Retaining Clip

1. **A DDR3 memory module is keyed with a notch so that it fits in only one direction.**
2. **DO NOT force the memory module into the socket in order to avoid damaging the memory module and the slot.**
3. **DDR3 memory modules are not interchangeable with DDR or DDR2.**
4. **DDR3 standard IS NOT backward compatible. You shall only install the DDR3 memory modules on this mainboard.**
5. **To enable the system boot-up successfully, always install the memory module into the DMMA1 slot first.**

1.7.5 Removing DIMM

Follow these steps to remove a DIMM.

1. Simultaneously press the retaining clips outward to unlock the DIMM.



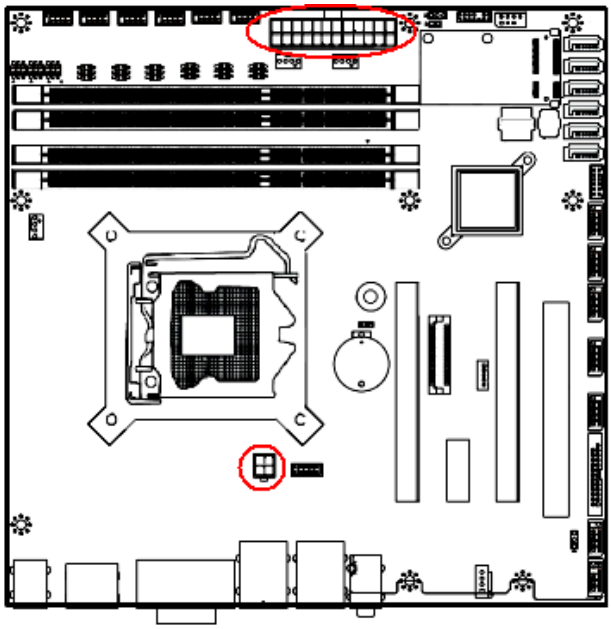
2. Remove the DIMM from the socket.

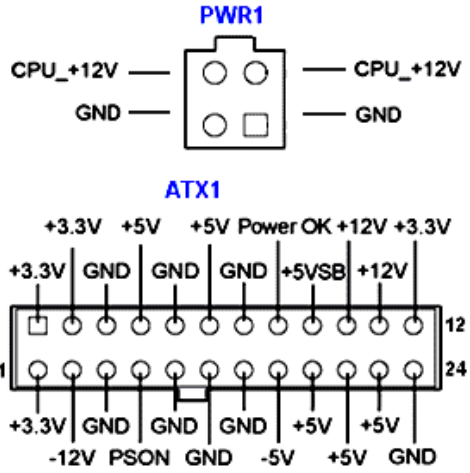
1.8 Power Supply

1.8.1 ATX Power Connectors: ATX1, PWR1

These ATX power connectors provide connections from power supply unit (PSU) to the mainboard. Both connectors need to be installed in order for the mainboard to function properly. The power supply plugs are designed to fit with these ATX power connectors in one orientation only. To connect these power supply plugs; find the proper orientation first, and then push down the power supply plugs firmly until the connectors are completely fit.

If you'd like to use the 20-pin ATX power supply, please align the 20-pin power connector from PSU to pin 1 & pin 13 of "ATX1". There is also a foolproof design on pin 11, 12, 23, & 24 to avoid wrong installation.

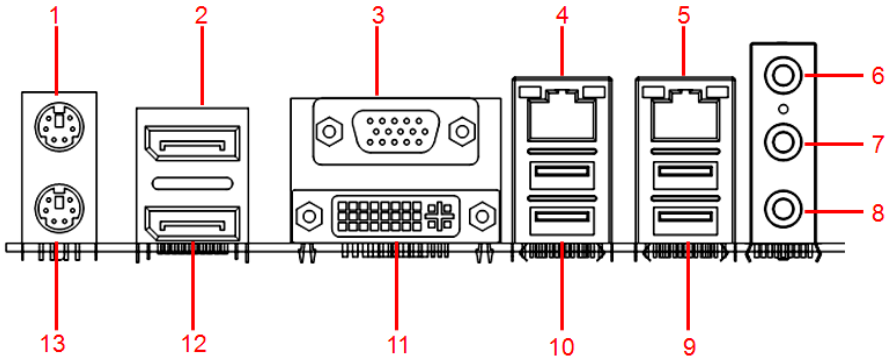


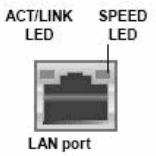


1. **It is recommended that you use a power supply unit (PSU) that complies with ATX 12V specification 2.0 (or later version) and provides a minimum power of 500W. If you are planning to fully load the slots and/or use a PCI-E x16 graphic card, a power supply with minimum power of 600W or more might be needed.**
2. **Do not forget to connect the 4-pin "PWR" power plug; otherwise, the system will not boot.**
3. **Use of a PSU with a higher power output is recommended when configuring a system with more power-consuming devices. The system may become unstable or may not boot if the power supply is inadequate.**

1.9 Back Panel

1.9.1 Back Panel Connectors



Item	Name	Function	Description
1	KBMS	PS/2 Mouse Connector	The port is for a PS/2 mouse.
2	DP2	Display Port 2	Provides “displayport” type connection to monitor.
3	VGA	VGA Video Port	The VGA15-pin Connector.
4/5	LAN1/ LAN2	Gigabit LAN (RJ-45) Connectors 	This port allows Gigabit connection to a Local Area Network (LAN) through a network hub. Refer to the table below for the LAN port LED indications.
6	AUDIO	Line-in port (Light blue)	This port connects a tape, CD, DVD player, or other audio sources.
7	AUDIO	Line-out port (Lime)	This port connects a headphone or a speaker. In 4-channel, 6-channel, and 8-channel configuration, the function of this port becomes Front Speaker Out.

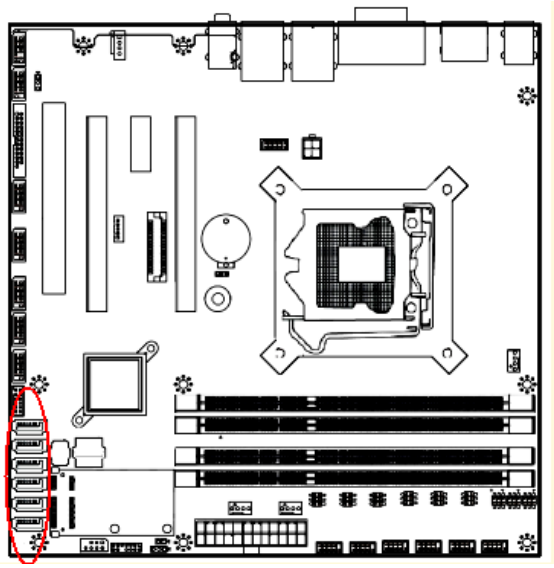
ACT/Link LED		Speed LED	
Status	Description	Status	Description
OFF	No link	OFF	10Mbps connection
Orange	Linked	Orange	100Mbps connection
Blinking	Data activity	Green	1Gbps connection

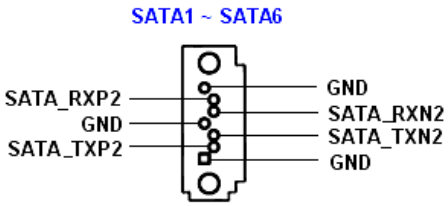
8	AUDIO	Microphone port (Pink)	This port connects a microphone.
9	USB	USB 3.0 Connectors	These two 4-pin Universal Serial Bus (USB) ports are available for connecting USB 3.0/ 2.0 devices.
10	USB	USB 3.0 Connectors	These two 4-pin Universal Serial Bus (USB) ports are available for connecting USB 3.0/ 2.0 devices.
11	DVI	DVI Video Port	DVI-D 24-Pin Connector.
12	DP1	Display Port 1	Provides “DisplayPort” type connection to monitor.
13	KBMS	PS/2 Keyboard Connector	This port is for a PS/2 keyboard.

1.10 Connectors/ Headers

1.10.1 Serial ATA Connectors: SATA3.0: SATA3, SATA4, SATA5, SATA6

SATA3.0 standard, which is backward compatible with SATA2.0

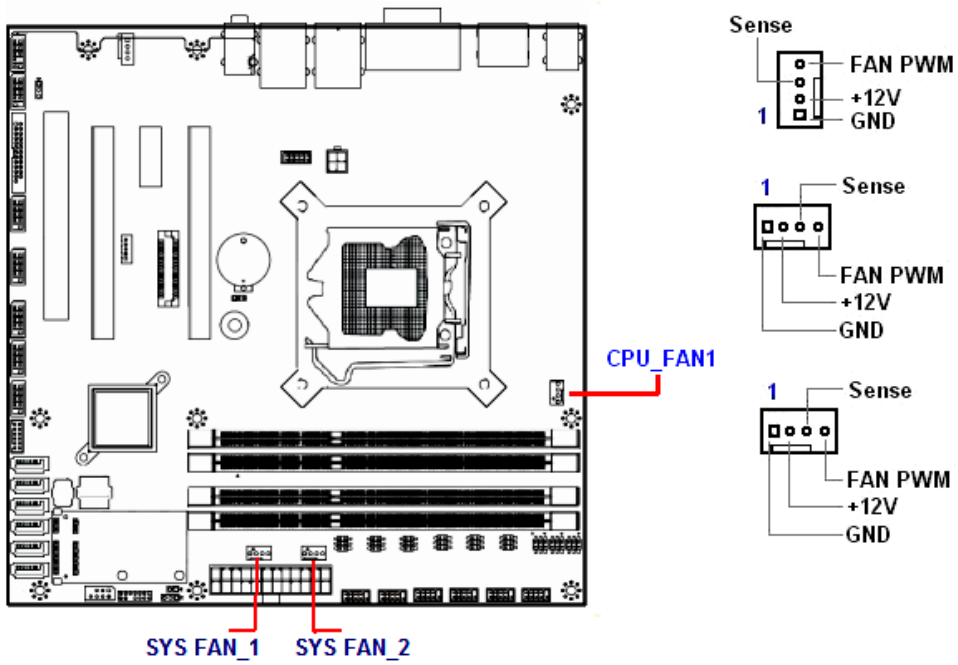




Please do not fold the Serial ATA cable into 90-degree angle. Otherwise, data loss may occur during data transmission.

1.10.2 Fan Power Connectors: CN7, CN3, CN4

The fan power connectors support system cooling fan with +12V. When connecting the wire to these fan connectors, please note that the red wire is designated as “Power” and should be connected to “+12V” pin; the black wire is designated as “Ground” and should be connected to “GND”. In order to take the advantage of System Hardware Monitor, be sure to use the fan which is specifically designed with speed sensor.

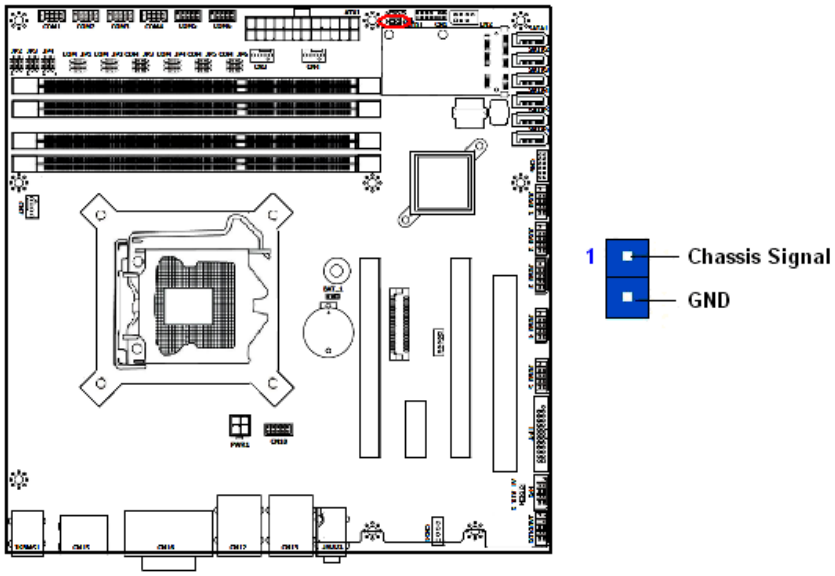


Please refer to the recommended CPU fans at processor’s official website or consult with the vendor for proper CPU cooling fan.

1.10.3 Chassis Intrusion Switch Connector: INTR1

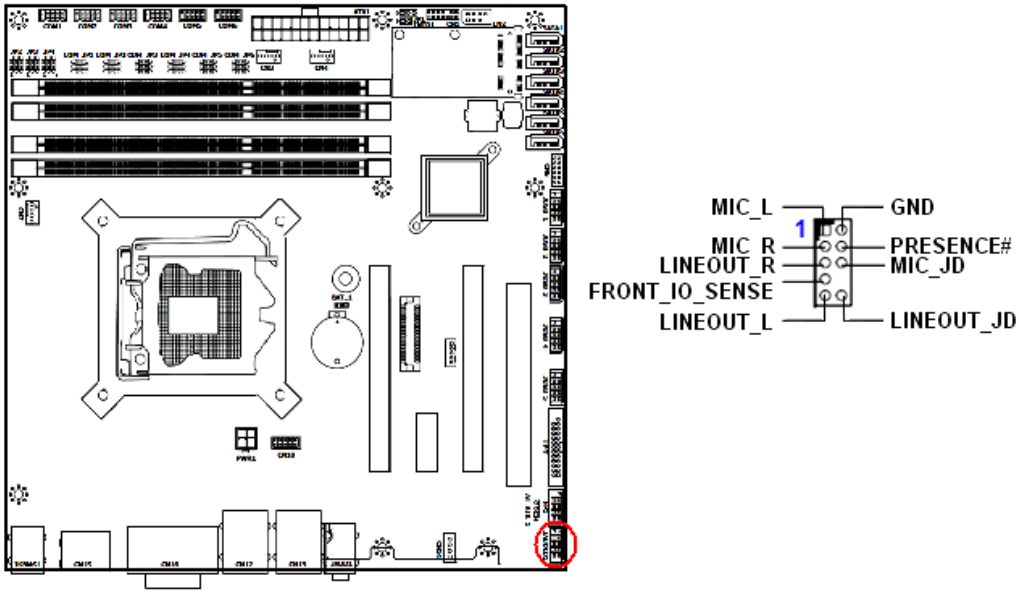
This connector connects to a 2-pin chassis switch. If the chassis is opened, the switch will be short. The system will record this status and show a warning message on the screen.

To clear the warning message, you must enter the BIOS and clear the record.



1.10.4 Front Panel Audio Connector: J_AUDIO1

This connector allows you to connect the front panel audio and is compliant with Intel® Front Panel I/O Connectivity Design Guide.

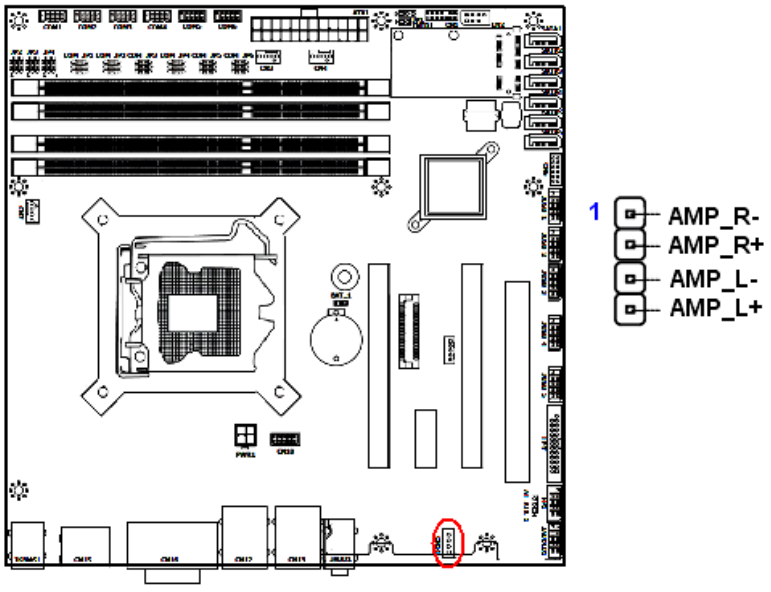


HD Audio Pin Definition

PIN	SIGNAL	DESCRIPTION
1	MIC_L	Microphone - Left channel
2	GND	Ground
3	MIC_R	Microphone - Right channel
4	PRESENCE#	Active low signal-signals BIOS that a High Definition Audio dongle is connected to the analog header. PRESENCE# = 0 when a High Definition Audio dongle is connected
5	LINE out_R	Analog Port - Right channel
6	MIC_JD	Jack detection return from front panel microphone JACK1
7	Front_JD	Jack detection sense line from the High Definition Audio CODEC jack detection resistor network
8	NC	No control
9	LINE out_L	Analog Port - Left channel
10	LINEout_JD	Jack detection return from front panel JACK2

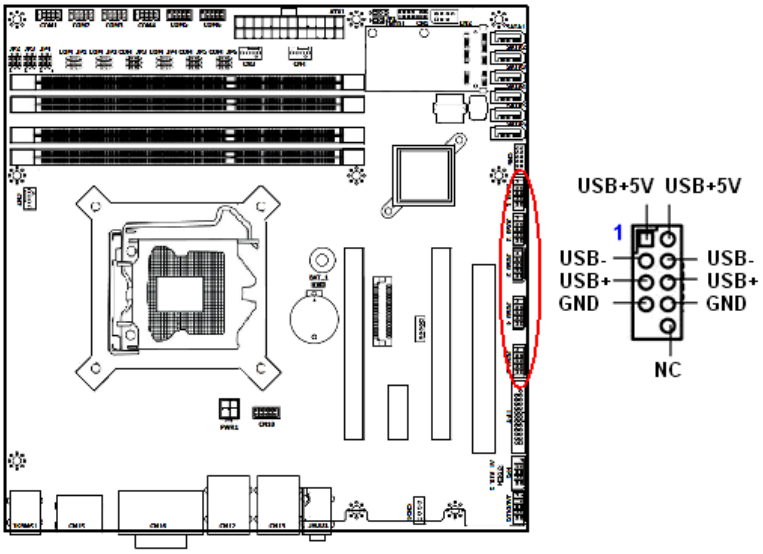
1.10.5 Amplifier Connector: CN14

This header provided amplified audio signals to external speakers (2-channels). The dB level can be adjusted under BIOS.



1.10.6 Front USB2.0 Headers: JUSB1, JUSB2, JUSB3, JUSB4, JUSB5

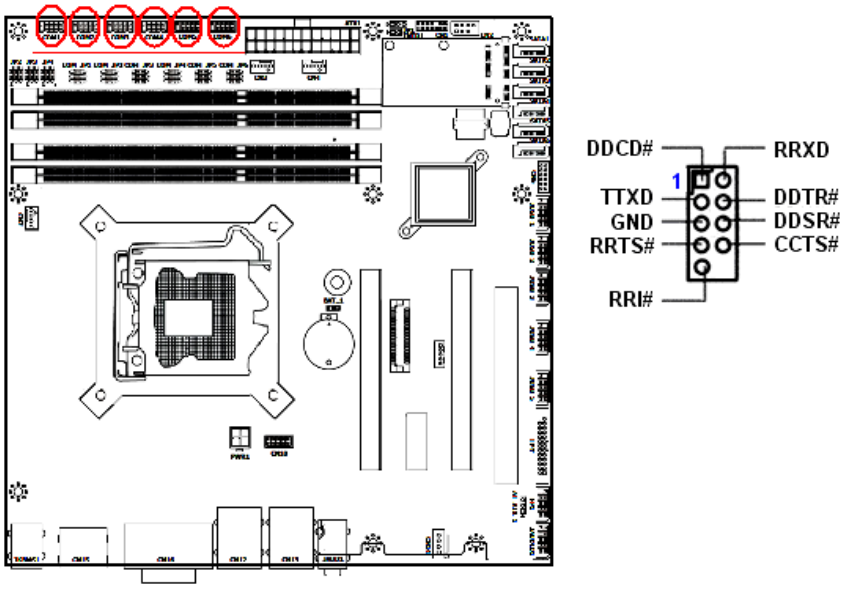
This connector is compliant with Intel® I/O Connectivity Design Guide, which is ideal for connecting high-speed USB peripherals such as USB HDD, USB digital cameras, USB MP3 players, USB printers, etc.



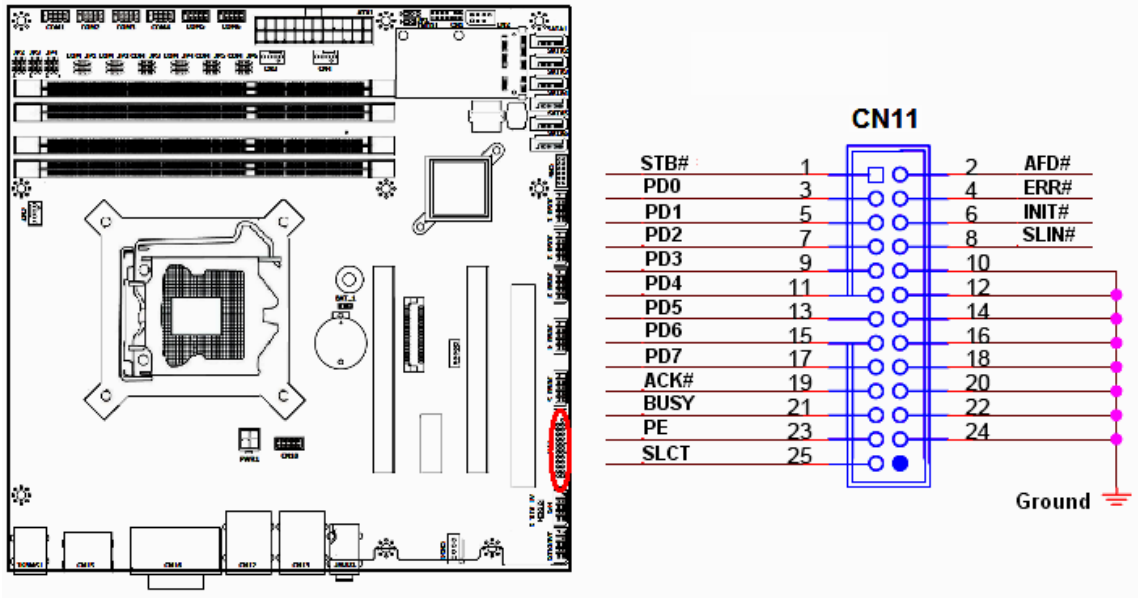
Be sure the pins of VCC and GND is connected to the connector correctly. Otherwise, it may cause damage to the USB port and/or the connected USB device.

1.10.7 Serial Port Connectors: COM1, COM2, COM3, COM4, COM5, COM6

This connector is a 16550A high speed communication port that sends/receives 16 byte FIFOs.

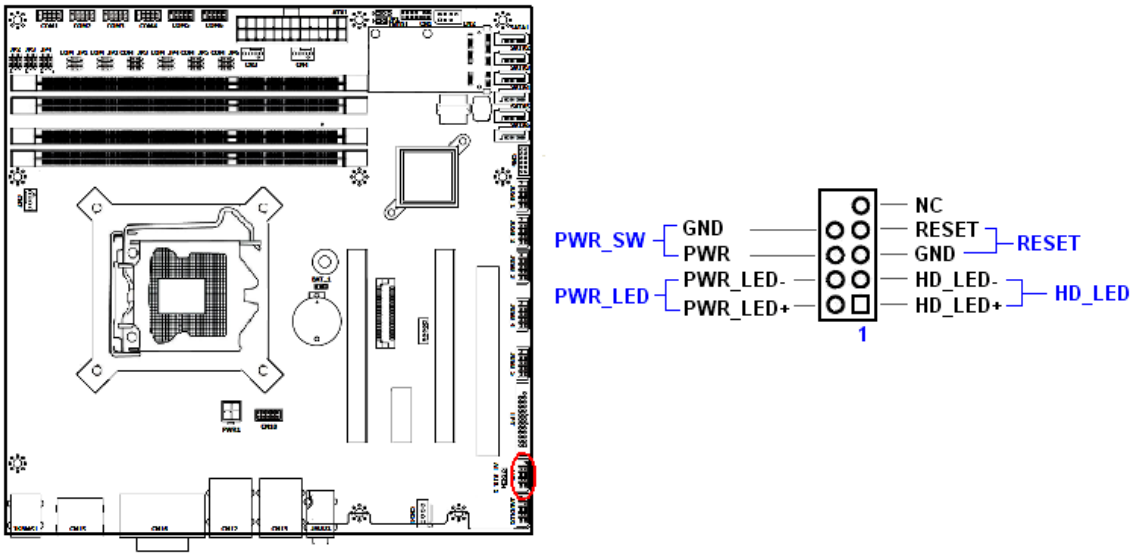


1.10.8 LPT Port Connector: CN11



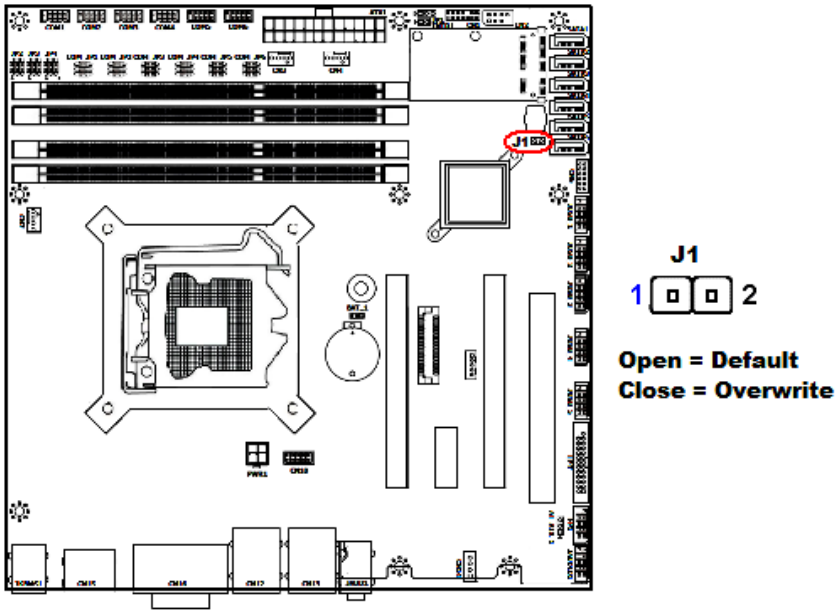
1.10.9 Front Panel Connectors: FP_1

These connectors are for electrical connections to the front panel switches and LEDs. The “F_PANEL1” connector is compliant with Intel® Front Panel I/O Connectivity Design Guide.



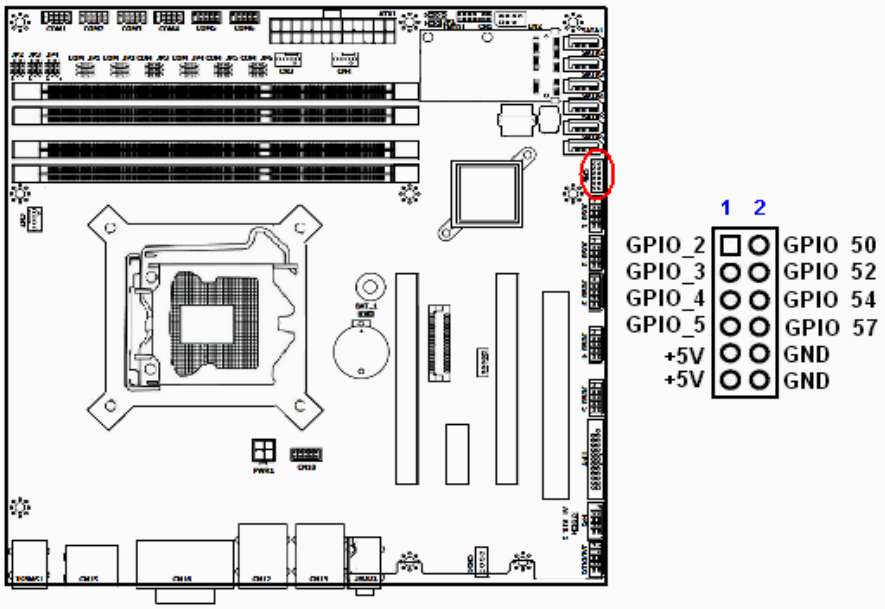
1.10.10 ME Lock Overwrite: J1

The “ME Lock Overwrite” header provides an option to program the entire BIOS even when the ME region had ME lock applied during board manufacturing to prevent unintentionally write to BIOS ME region, ME lock is recommended by Intel for system manufacture.



1.10.11 Digital I/O Connector: CN6

This header provides connections to GPIO ports.



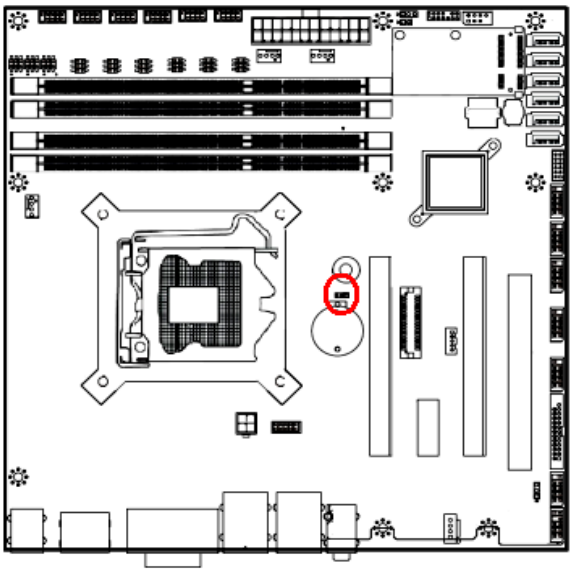
1.11 Jumpers

1.11.1 Clear CMOS Jumper: JP5

There is a CMOS RAM onboard that has a power supply from an external battery to keep the data of system configuration.

For normal state (default), the jumper is set on pin location 1 and 2.

To clear the CMOS, set the jumper to pin location 2 and 3 for at least 30 seconds while the system is off.



1-2: Normal (Default)

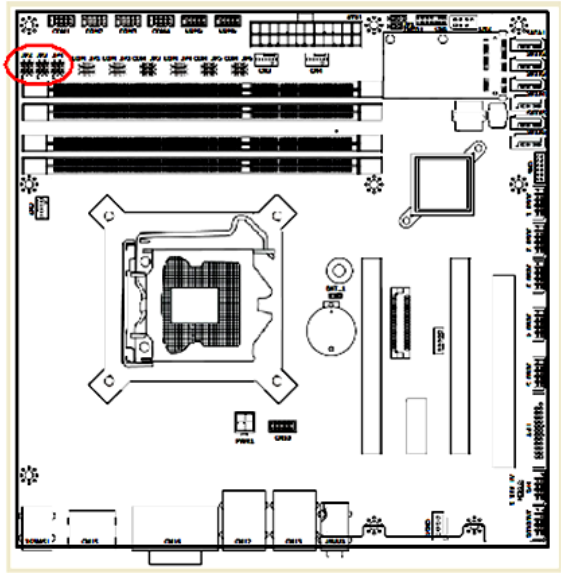
2-3: Clear CMOS

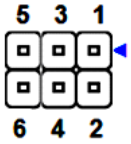
1. You can clear CMOS by shorting pin 2-3 for at least 30 seconds (while the system is OFF), then place the jumper back to pin 1-2 for normal operation.

2. Avoid clearing the CMOS while the system is ON; this will damage the mainboard.

1.11.2 COM1 RS232/ RS422/ RS485 Select: JP2, JP3, JP4

These jumpers provide combinations for RS232 (default), or RS422, or RS485 transfer mode on COM1 (rear I/O).



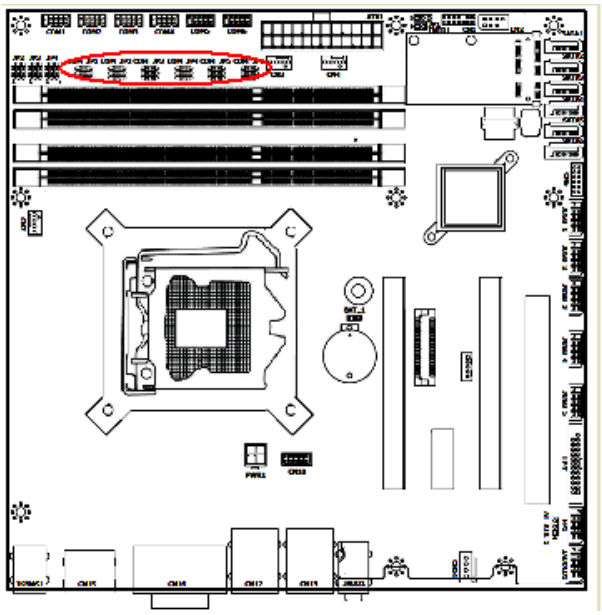


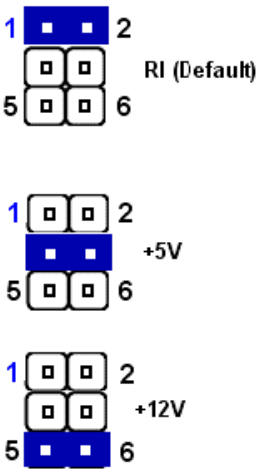
COM1 RS232/ RS422/ RS485 Settings			
Function	JP2	JP3	JP4
RS232 (Default)	1-3 2-4	1-3 2-4	1-2
RS422	3-5 4-6	3-5 4-6	3-4
RS485	3-5 4-6	3-5 4-6	5-6

1.11.3 COM1, COM2, COM3, COM4, COM5 and COM6 Ring-in/ +12V/ +5V Power Select:

Com_JP1, COM_JP2, COM_JP3, COM_J4, COM_JP5, COM_JP6

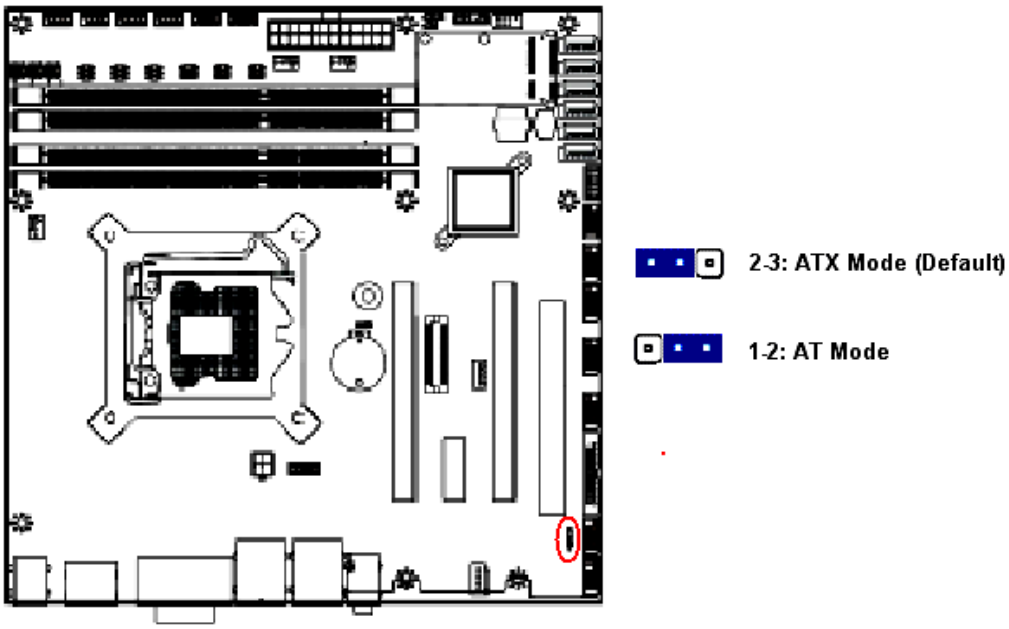
These headers provide ring-in, or 5V, or 12V on the com ports.





1.11.4 ATX/AT Mode Selection: AT_ATX_1

This header provides the option to boot the system in the form of ATX mode (default) or AT mode. When the system is set in AT mode, the system power on/off will be controlled directly by the power switch on power supply. And some of the power saving modes will not function as ATX mode provided.



1.12 The Expansion Slots

In the future, you may need to install expansion cards. The following sub-sections describe the expansion slots and the expansion cards that they support.

Make sure to unplug the power cord before adding or removing expansion cards. Failure to do so may cause you physical injury and damage mainrboard components.

1.12.1 Installation of Expansion Card

To install an expansion Card:

1. Before install the expansion card, read the documentation that came with it and make the necessary hardware setting for the card.
2. Remove the chassis cover (if the mainboard is installed in a chassis).
3. Remove the expansion slot bracket from the chassis on the slot that you intend to use. Keep the screw for later use.

4. Align the card connector with the slot and press it firmly until the card is completely seated on the slot.
5. Secure the card to the chassis with the screw that have been removed earlier (in step 3).
6. Place the chassis cover back on.

1.12.2 Setup An Expansion Card

After installing the expansion card, configure it by adjusting the software settings.

1. Turn on the system and change the BIOS settings if necessary. See Chapter 2 for information on BIOS setup.
2. Install the software drivers for the expansion card.

1.12.3 PCI (Peripheral Component Interconnect) Express Slot

The PCI Express slot supports the PCI Express interface expansion card.

- The PCI Express x16 (PCI-E x16) supports up to 4.0GB/s transfer rate.
- The PCI Express x8 (PCI-E x8) supports up to 2.0GB/s transfer rate.
- The PCI Express x4 (PCI-E x4) supports up to 1.0GB/s transfer rate.
- The PCI Express x1 (PCI-E x1) supports up to 250MB/s transfer rate.

1.12.3.1 PCI-E x 16 Slot: SLOT1

The PCIEX16 slot supports PCI-E x16 graphic card.

PCI Express x16 Slot

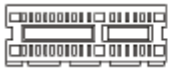
1.12.3.2 PCI-E x 4 Slot: SLOT3

The PCIE X 4 slots supports PCI-E transfer rate **up to 4x ONLY (Yellow slot).**

PCI Express x16 Slot

1.12.3.3 PCI-E x1 Slot: SLOT2

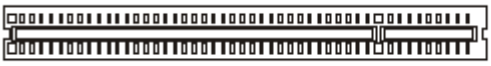
This slot supports PCI-E x1 cards.



PCI Express x1 Slot

1.12.3.4 PCI Slots: SLOT4

The PCI slot supports LAN card, SCSI card, USB card, and other add-on cards that comply with PCI specifications.



32-bit PCI Slot

1. When adding or removing expansion cards, make sure the system power is OFF.

2. After the card is installed on the system, make the adjustments under system BIOS if necessary, then install the card driver provided by the card vendor under system OS.

3. When using PCI cards on shared slots, ensure that the card driver support "Share IRQ" or the PCI cards do not need IRQ assignments. Otherwise, conflicts will arise between the two PCI groups; marking the system unstable and the card inoperable.

2. Chapter 2: Starting Up the System

2.1 Starting Up Your System

1. After all connections are made, close your computer case cover.
2. Be sure all the switches are off, and check that the power supply input voltage is set to the local voltage, usually in-put voltage is 220V~240V or 110V~120V depending on your country's voltage used.
3. Connect the power supply cord into the power supply located on the back of your system case according to your system user's manual.
4. Turn on your peripheral in following order:
   a. Your monitor.
   b. Other external peripheral (Printer, Scanner, External Modem etc…)
   c. Your system power. For ATX power supplies, you need to turn on the power supply and press the ATX power switch on the front side of the case.
5. The power LED on the front panel of the system case will light. The LED on the monitor may light up or switch between orange and green after the system is on. If it complies with green standards or if it is has a power standby feature. The system will then run power-on test. While the test are running, the BIOS will alarm beeps or additional message will appear on the screen.

   If you do not see any thing within 30 seconds from the time you turn on the power. The system may have failed on power-on test. Recheck your jumper settings and connections or call your retailer for assistance.

Beep	**Meaning**
One short beep when displaying logo	No error during POST
Long beeps in an endless loop	No DRAM install or detected
One long beep followed by three short beeps	Video card not found or video card memory bad
High frequency beeps when system is working	CPU overheated System running at a lower frequency

6. During power-on, press <Del> key to enter BIOS setup. Follow the instructions in BIOS SETUP.
7. If you wish to boot from a different bootable device other than the default arrangement under the BIOS, you may press <F11> key during the system power-on (post); a menu with all detected bootable

devices which are attached to the system will be displayed. Then you may select the desired first bootable device from this menu.

8. **Power off your computer:** You must first exit or shut down your operating system before switch off the power switch. For ATX power supply, you can press ATX power switching after exiting or shutting down your operating system. If you use Windows Operating Systems, click **"Start"** button, click **"Shut down"** and then click **"Shut down the computer"** The power supply should turn off after windows shut down.